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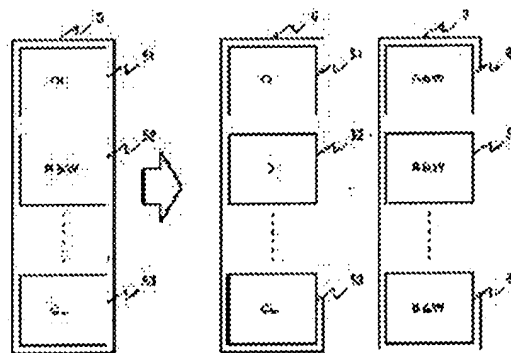
(22)Date of filing : 30.03.2001 (72)Inventor : MAEI YOSHIHIRO
ORITA KATSUHIKO

(54) INTERNET FACSIMILE TERMINAL AND FACSIMILE TRANSFER METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an Internet facsimile terminal that transfers by fax color image data attached to received electronic mail.

SOLUTION: The Internet facsimile terminal applies black/white conversion to color image data 51, 53 in an original image file 5 to obtain black/white image data 61, 63 and to create a black/white image file 7, eliminates black/ white image data 52 from the original image file 5 to create a color image file 6, transfers both the color image file 6 and the image data 52 having originally been the black/white data in the image data included in the black/white image file 7 when the transfer destination of the electronic mail with the original image file 5 attached thereto is a color facsimile terminal, but transfers only the black/white image file 7 when the transfer destination is a black/white facsimile terminal.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the Internet facsimile apparatus which carries out the facsimile transfer of the image file attached to the electronic mail received via the Internet through a dial-up line about the Internet facsimile apparatus.

[0002]

[Description of the Prior Art] In recent years, the Internet facsimile apparatus which enables transmission and reception of the data on Internet Protocol has come to be seen with a rapid expansion of the Internet. Generally the Internet facsimile apparatus of the type send and receive image data as a communications protocol especially using SMTP (Simple Mail Transfer Protocol) is used.

[0003] As the minimum function which this Internet facsimile apparatus should hold, that a communications protocol is SMTP, supporting MIME (Multi Purpose Mail Extension), supporting the minimum set of a TIFF(Tagged Image File Format)-FX file, etc. are specified in RFC2305.

[0004] Moreover, it has specified that a minimum set specifically supports monochrome image, that compressed format is MH (Modified Huffman coding), that the width of face of a form is an equivalent for A4, that resolution is 200x100dpi or 200x200dpi, that a data list is LSB, etc.

[0005] By the way, a format of the image data attached to the electronic mail received via the Internet in the function which the Internet facsimile apparatus has is changed into the facsimile format based on the above-mentioned minimum set, and the function (E-mail to FAX Gateway function) to transmit to the usual facsimile apparatus through a dial-up line network (PSTN/ISDN) exists.

[0006]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional E-mail to FAX Gateway function, since adjustment between the formats of image data and facsimile formats which were attached to the electronic mail was not able to be taken, the problem that a facsimile transfer of the image data concerned may be unable to be performed had arisen.

[0007] Many of especially usual facsimile apparatus connected to a dial-up line network cannot transmit this image file as it is to the facsimile apparatus which is supporting only monochrome image, when color picture data are contained in the image file which supported only monochrome image, therefore was attached to the electronic mail.

[0008] In the conventional Internet facsimile apparatus, when color picture data were contained in the image file which was attached to the electronic mail and received, a facsimile transfer was not able to be performed about this color picture data.

[0009] This invention aims at offering the Internet facsimile apparatus which makes it possible to transmit to the usual facsimile apparatus by which the color picture data which it was made in view of the above-mentioned problem, it was attached to the electronic mail in the Internet facsimile apparatus which has an E-mail to FAX Gateway function, and were received via the Internet are connected to a dial-up line network.

[0010]

[Means for Solving the Problem] In order to attain the purpose mentioned above, invention according to claim 1 In the Internet facsimile apparatus which has the function which carries out the facsimile transfer of the image file attached to the electronic mail which connected with both network and dial-up line, and was received through said network A judgment means to judge whether the image data contained in said image file is a color, or it is black and white, A monochrome image file creation means to create monochrome image file which consists of only monochrome image data by changing into black and white the image data judged by said judgment means of the image files attached to said electronic mail to be a color, When the destination of the image file attached to said electronic mail is monochrome facsimile apparatus, it is characterized by transmitting monochrome image file created with said monochrome image file creation means.

[0011] That is, the transfer to monochrome facsimile apparatus of the color picture data attached to the electronic mail is attained.

[0012] Moreover, invention according to claim 2 has further a color picture file creation means to create the color picture file which consists of only color picture data by deleting monochrome image data from the image file attached to said electronic mail in invention according to claim 1. When the destination of the image file attached to said electronic mail is color facsimile equipment, Monochrome image file created with the color picture file created with said color picture file creation means and said monochrome image file creation means is transmitted. When said destination is monochrome facsimile apparatus, it is characterized by transmitting only monochrome image file created with said monochrome image file creation means.

[0013] That is, since it was not because it is [whether the facsimile apparatus of the destination is a color, or] black and white, but the image file concerned can always be transmitted and it was made not to hold the same monochrome image data in a duplex by the color picture file and monochrome image file also when color picture data were contained in the image file attached to the electronic mail, memory space can be saved.

[0014] Moreover, invention according to claim 3 is characterized by said monochrome image file creation means changing the resolution of these color picture data into the resolution currently supported by monochrome facsimile, when the resolution of the color picture data contained in the image file attached to said electronic mail is the resolution which is not supported by monochrome facsimile in invention according to claim 1.

[0015] Thereby, the color picture of 100x100 (dpi) can be transmitted to monochrome facsimile by actual size.

[0016] Moreover, invention according to claim 4 is characterized by said color picture file creation means changing into the color gamut based on ITU-T recommendation T.42 the color gamut of the image data judged by said judgment means to be a color in invention of claim 2.

[0017] Moreover, invention according to claim 5 is characterized by said color picture file creation means changing the number of bits into the number of bits currently supported by color facsimile per sample of the image data judged by said judgment means to be a color in invention according to claim 2.

[0018] Moreover, invention according to claim 6 is connected with both network and dial-up line. In the Internet facsimile apparatus which has the function to transmit the image file attached to the electronic mail received through said network to the destination

facsimile apparatus connected to said public telephone network A destination judging means to judge whether said destination facsimile apparatus is color facsimile equipment or it is monochrome facsimile apparatus, It has a conversion means to change into monochrome image data the color picture data contained in said image file. When judged with destination facsimile apparatus being monochrome facsimile apparatus by said destination judging means, it is characterized by transmitting said image file which changed color picture data into monochrome image data with said conversion means to this destination facsimile apparatus.

[0019] Moreover, in invention according to claim 6, after invention according to claim 7 changes color picture data into monochrome image data with said conversion means, it is characterized by carrying out call origination to said destination facsimile apparatus.

[0020] That is, since a color picture file and monochrome image file can be created beforehand, transform processing after carrying out call origination to destination facsimile apparatus becomes unnecessary, and the transfer time becomes short.

[0021] Moreover, in invention according to claim 6, after carrying out call origination of the invention according to claim 8 to said destination facsimile apparatus, it is characterized by changing color picture data into monochrome image data with said conversion means.

[0022] That is, when destination facsimile apparatus is color facsimile equipment, since it is not necessary to carry out monochrome transform processing of color picture data, it is efficient.

[0023] Moreover, invention according to claim 9 is connected with both network and dial-up line. In the facsimile transfer approach by the Internet facsimile apparatus which has the function which carries out the facsimile transfer of the image file attached to the electronic mail received through said network It judges whether the image data contained in said image file is a color, or it is black and white. Monochrome image file which consists of only monochrome image data by changing into black and white the image data judged to be a color is created, and when the destination of the image file attached to said electronic mail is monochrome facsimile apparatus, it is characterized by transmitting said monochrome image file.

[0024] Moreover, invention according to claim 10 creates the color picture file which consists of only color picture data by deleting monochrome image data from the image file attached to said electronic mail in invention according to claim 9. When the destination of the image file attached to said electronic mail is color facsimile equipment, It is characterized by transmitting both said color picture file and said monochrome image file, and transmitting only said monochrome image file, when said destination is monochrome facsimile apparatus.

[0025] Moreover, in invention according to claim 9, invention according to claim 11 is characterized by changing the resolution of these color picture data into the resolution currently supported by monochrome facsimile, and changing into monochrome image data, when the resolution of the color picture data contained in the image file added to said electronic mail is the resolution which is not supported by monochrome facsimile.

[0026] Moreover, invention according to claim 12 is characterized by changing into the color gamut based on ITU-T recommendation T.42 the color gamut of the image data judged to be said color in invention according to claim 10.

[0027] Moreover, invention according to claim 13 is characterized by changing the

number of bits into the number of bits currently supported by color facsimile per sample of the image data judged to be said color in invention according to claim 10.

[0028] Moreover, invention according to claim 14 is connected with both network and dial-up line. In the facsimile transfer approach by the Internet facsimile apparatus which has the function to transmit the image file attached to the electronic mail received through said network to the destination facsimile apparatus connected to said public telephone network The color picture data contained in said image file are changed into monochrome image data. When said destination facsimile apparatus is monochrome facsimile apparatus, it is characterized by transmitting the image file which changed said color picture data into monochrome image data to this destination facsimile apparatus.

[0029] Moreover, in invention according to claim 14, after invention according to claim 15 changes said color picture data into monochrome image data, it is characterized by carrying out call origination to said destination facsimile apparatus.

[0030] Moreover, in invention according to claim 14, after carrying out call origination of the invention according to claim 16 to said destination facsimile apparatus, it is characterized by changing color picture data into monochrome image data.

[0031]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the Internet facsimile apparatus concerning this invention is explained to a detail with reference to an accompanying drawing.

[0032] Drawing 1 is the system configuration Fig. showing an example of the configuration of the communication system containing the Internet facsimile apparatus concerning this invention.

[0033] In drawing 1, the Internet facsimile apparatus 11 and the mail server 12 which have an E-mail to FAX Gateway function were connected and constituted, and have connected LAN (Local Area Network) 10 to the Internet 30 through a router 13.

[0034] Similarly, the network terminal unit 21 and the mail server 22 were connected and constituted, and have connected LAN 20 to the Internet 30 through a router 23.

[0035] Here, the network terminal units 21 are communication devices which enable transmission and reception of the data on Internet Protocol, such as a personal computer (PC) and the Internet facsimile apparatus.

[0036] Moreover, mail servers 12 and 22 relay the electronic mail transmitted from each network terminal unit while they accumulate the electronic mail received by the Internet 30 course based on the destination information according to each network terminal unit linked to LAN 10 or 20 and distribute the accumulated electronic mail concerned according to the demand from each network terminal unit.

[0037] The usual facsimile apparatus 41 corresponding to the F code which has G3 or G4FAX communication facility is connected to the dial-up line network (PSTN/ISDN) 40.

[0038] The Internet facsimile apparatus 11 has both facsimile communication facility and a network communication function, it has an E-mail to FAX Gateway function, functions as the off-lamp gateway, and transmits it to a dial-up line 40 by using as facsimile data the electronic mail received via the Internet 30 while it performs data communication through the Internet 30, and facsimile communication through the dial-up line network 40.

[0039] If the Internet facsimile apparatus 11 using POP accesses a mail server 12, checks

the existence of the electronic mail addressed to self-equipment and has an electronic mail addressed to self-equipment, specifically, it will carry out a facsimile transfer to the destination specified by the electronic mail concerned by using as facsimile data the image file attached to the electronic mail concerned.

[0040] Drawing 2 is drawing having shown the format conversion approach to the facsimile format of the image file attached to the electronic mail in the Internet facsimile apparatus of this invention.

[0041] the image file (henceforth an original image file) 5 attached to the electronic mail in drawing 2 -- color picture data (CL) -- it has two or more image data containing 51 and 53, and monochrome image data (B&W) 52, and is constituted.

[0042] From the network terminal unit 21, this original image file 5 was attached to the electronic mail, and was transmitted to facsimile apparatus 41, it is received by the Internet facsimile apparatus 11 and format conversion processing to a facsimile format is once performed by the E-mail to FAX Gateway function which the Internet facsimile apparatus 11 has.

[0043] The original image file 5 is divided into the color picture file 6 which consists only of color picture data, and monochrome image file 7 which consists only of monochrome image data in the case of the format conversion processing by this E-mail to FAX Gateway function.

[0044] The color picture file 6 is an image file which deletes monochrome image data and is obtained from the original image file 5, and monochrome image file 7 is an image file which changes the color picture data of the original image file 5 into monochrome image data, and is obtained.

[0045] A phase hand loom can respond to whether it is a color machine or it is monochrome machine immediately by creating beforehand such the color picture file 6 and monochrome image file 7 before FAX call origination.

[0046] Moreover, by deleting monochrome image data from the original image file 5, and creating the color picture file 6, it can avoid holding the same monochrome image data to a duplex by the color picture file 6 and monochrome image file 7, and memory space can be saved.

[0047] Drawing 3 is a flow chart which shows an example of the facsimile transfer procedure of the image file attached to the electronic mail by the E-mail to FAX Gateway function of the Internet facsimile apparatus concerning this invention.

[0048] If the electronic mail addressed to self-equipment is received (step 101), the Internet facsimile apparatus 11 It judges whether color picture data are contained in the original image file 5 attached to the electronic mail concerned (step 102). If color picture data are not contained (it is NO at step 102) All PEJI ** of the original image file 5 are changed into a facsimile format as they are (step 113). FAX call origination is carried out (step 114), and FAX transmission is carried out in the destination (here, it considers as facsimile apparatus 41) specified for the destination information on an electronic mail (step 115).

[0049] When color picture data are contained (it is YES at step 102), a color or black and white is judged for each image data of every (step 103).

[0050] If a judgment result is a color (it is YES at step 103), this will be changed into black and white (step 104), and it will add to monochrome image file 7 (step 105). If it is black and white (it is NO at step 103), this image data will be added to monochrome

image file 7 (step 110), and the image data concerned will be deleted from the original image file 5 (step 111).

[0051] The above-mentioned actuation is performed about all the image data of the original image file 5 (step 106), carries out FAX call origination to facsimile apparatus 41 after that (step 107), and it judges whether facsimile apparatus 41 is color facsimile equipment (step 108).

[0052] When facsimile apparatus 41 is monochrome facsimile apparatus (it is NO at step 108), FAX transmission only of the monochrome image file 7 is carried out (step 109), and when it is color facsimile equipment (it is YES at step 108), FAX transmission of both image data (image data 52) it was ***** of [whose] the image data contained in the color picture file 6 and monochrome image file 7 from the first is carried out (step 112).

[0053] In addition, it is good for the image data (image data 61 and 62) it was a ** color of [whose] the image data contained in monochrome image file 7 from the first to add the information which shows that.

[0054] Moreover, in the above-mentioned example, although format conversion of image data was performed before FAX call origination, after carrying out FAX call origination first and judging the capacity of a phase hand loom, it is also convertible for the format suitable for the capacity of a phase hand loom. According to this approach, since it is not necessary to create the color picture file 6 and when a phase hand loom is monochrome facsimile apparatus, and it is not necessary to create monochrome image file 7 when a phase hand loom is color facsimile equipment, it is efficient.

[0055] Now, in case the off-lamp gate wait of the Internet facsimile apparatus in this invention is carried out and it functions, it performs conversion of resolution, conversion of a color gamut, transform processing of the number of bits per sample, etc. other than transform processing to monochrome image data of the above-mentioned color picture data.

[0056] First, transform processing of resolution at the time of carrying out format conversion of the color picture data to a format of monochrome facsimile is explained. Drawing 4 is a flow chart which shows the procedure of the resolution conversion at the time of the Internet facsimile apparatus of this invention functioning as the off-lamp gateway.

[0057] In addition, processing of this resolution conversion is performed between step 103 of a facsimile transfer procedure and step 104 which were shown in drawing 3.

[0058] The judgment about resolution is performed about the image data judged that is color picture data in step 103 (step 201).

[0059] Here, in a facsimile format, if judged with resolution being 100x100 (dpi) (it is YES at step 201), since monochrome image data of 100x100 (dpi) is not supported, after it changes the resolution of this color picture data into 200x200 or 200x100 (dpi) (step 202), it will progress to step 104 and will perform monochrome transform processing.

[0060] Next, color-gamut transform processing at the time of carrying out format conversion of the color picture data to a format of color facsimile is explained.

[0061] Drawing 5 is a flow chart which shows the procedure of the color-gamut conversion at the time of the Internet facsimile apparatus of this invention functioning as the off-lamp gateway.

[0062] The color picture file 6 obtained by the procedure to step 107 of the facsimile

transfer procedure shown in drawing 3 Each components L (lightness) and a (green - red's color element) in a Lab color model, Since it depends for a format of color facsimile based on ITU-T recommendation T.42 and only the narrow color gamut is supported to the color gamut of b (color element of blue - yellow) being expressed by arbitration between maximum and the minimum value, it changes into the color gamut specified by T.42 (step 301).

[0063] Next, the number-of-bits conversion per sample at the time of carrying out format conversion of the color picture data to a format of color facsimile is explained.

[0064] Drawing 6 is a flow chart which shows the procedure of the number-of-bits conversion per sample at the time of the Internet facsimile apparatus of this invention functioning as the off-lamp gateway.

[0065] The number of bits per sample is in the image data contained in the color picture file 6 obtained by the procedure to step 107 of the facsimile transfer procedure shown in drawing 3 for any value, respectively. However, in a format of color facsimile, since 8 bits is a default, the number of bits per sample is changed into NO) and 8 bits at the (step 401 about the color picture data whose numbers of bits per sample are the numbers of bits other than 8 bit (step 402).

[0066]

[Effect of the Invention] As explained above, in case the Internet facsimile apparatus which has an E-mail to FAX Gateway function functions as the off lamp gateway according to this invention When color picture data are contained in the image file attached to the electronic mail which this Internet facsimile apparatus received, By carrying out format conversion of the color picture data concerned to the facsimile format suitable for the capacity of the facsimile apparatus of a transmission place, the effectiveness that the color picture data transfer which was not able to be treated becomes possible is done so with the usual facsimile apparatus.